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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 09/815,983      | 03/23/2001  | Mark Lynn Jenson     | 1327.005US1         | 7609             |

7590 01/11/2005  
LEMAIRE PATENT LAW FIRM, PLLC  
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EXAMINER

BELL, BRUCE F

| ART UNIT | PAPER NUMBER |
|----------|--------------|
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1746

DATE MAILED: 01/11/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/815,983

Applicant(s)

JENSON ET AL.

Examiner

Bruce F. Bell

Art Unit

1746

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on the RCE dated September 24, 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-22 and 37-116 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-6, 8-12, 16-22, 37, 42-45, 53, 54, 62-70, 81-84, 87, 91-95, 98-102 and 106-113 is/are rejected.
- 7) ☒ Claim(s) 7, 13-15, 38-41, 46-52, 55-61, 71-80, 85, 86, 88-90, 96, 97, 103-105 and 114-116 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 March 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 9/24/04; 10/29/04.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Claim Objections***

1. Claims 114, 115 and 116 are objected to because of the following informalities: Claims 114, 115 and 116 appear to all be duplicate claims. Two of these claims need to be cancelled or amended to overcome the objection to these claims.

Appropriate correction is required.

Claims 6, 8, 10, 11, 12, 46, 62, 66, 67, 70 are objected to because of the following informalities: Claims 6, 8, 10, 11, 12 appear to be duplicate claims to claims 46, 62, 66, 67 and 70. These duplicate claims need to be cancelled or amended to overcome the objection to these claims.

Appropriate correction is required.

Benefit for prior in the 35 USC 103 listed below has not been given, since the examiner can not find in the provisional applications where the aspect of the electrolyte is deposited by the dual laydown method as set forth in applicant's instant claims and therefore, the use of the Chen et al and Johnson patents listed in the 103 rejection are deemed to be proper.

### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-6, 8-12, 16-22, 37, 42-45, 53, 54, 62-70, 81-84, 87, 91-95, 98-102, 106-113 rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson (6402796) in combination with Allen et al (6077621) and Chen et al (6645656).

Johnson discloses a method of making a thin-film battery having a cathode current collector, cathode, electrolyte, anode and anode current collector. See abstract. The patent teaches the use of a cathode material made of a lithium intercalation material such as  $\text{LiCoO}_2$ , a solid state electrolyte of a lithium phosphorous oxynitride and an anode of lithium metals or alloys thereof. See col. 2, lines 8-22. The patent further discloses that sputtering devices are used in the making of the thin-film battery device. The current collector layers are shown to have been made thin, being 250 Angstroms in thickness. See col. 5, lines 7-8.

The prior art of Johnson does not teach that the electrolyte material is laid down using a first and second deposition source.

Allen et al discloses a method of forming metal, metal oxide or metal alloy coatings on an ion conductive polymer membrane using a high energy electron beam of ions. See abstract. The system uses a dual beam to aid in the deposition of the metal, metal oxide or metal alloy layers. The low energy beam cleans the membrane surface, while the high energy beam deposits the thin metal, metal oxide or metal alloy films. See col. 4, lines 16-25. The dual ion beam assisted deposition (dual IBAD) combines vapor deposition with simultaneous ion

beam bombardment. The vapor deposition is initiated via electron beam evaporation of the source and at the same time two ion beams converge on the substrate. The low energy beams are argon ions which cleans the surface through ion sputtering. The higher energy beam is oxygen or nitrogen ions and the electron evaporated species ions (such as platinum, iridium, gold, rhenium, rhodium, tantalum, tungsten, silver, zinc, iron, copper, nickel, etc.) that are aimed at the surface. The dual IBAD densifies the film forming and improves the adhesion between the film and the surface on which it is being deposited. See col. 4, lines 32-50. The film's porosity can be controlled, and range from being highly dense and impervious ( for example as a thin coating to create ion-selective membranes) to highly porous (for gas diffusion electrodes or fuel cell electrodes). See col. 4, lines 61-66. The energy of the high and low power ion beam is dictated by both the gas employed and the power available to the equipment. Typical low power beams range from 100-500 eV while the high power beams range from 500-2000 eV. The IBAD methodology has been used to coat ion conducting membranes and create electrode and membrane structures of far greater film adhesion and interface control. See col. 5, lines 35-55. The deposition of metal, metal oxide or metal alloys maybe deposited with film thicknesses of around 200-600 angstroms. See examples.

Chen et al discloses a thin film solid oxide fuel cell having a thin film electrolyte deposited onto one side of a metal foil. See abstract. The patent shows a metal

foil Nickel substrate onto which YSZ electrolyte film is deposited, followed by deposition of an LSCO cathode thin film. See Figures. The electrolyte layer is epitaxially grown on the nickel substrate, to be crystallographically ordered. See col. 2, lines 12-17. Various deposition techniques can be used for the film deposition. See col. 2, lines 27-31. Ion Beam assisted deposition (IBAD) is shown to be used so that the surface of the substrate allows for growth of an atomically ordered electrolyte layer as well as subsequent layers such as the cathode. See col. 4, lines 1-9. The patent shows that pure hydrogen or forming gas or other reducing gas mixture can be introduced into the thin film deposition chamber to reduce oxidation of the nickel or other metal substrate under any of the oxide thin film growth techniques. See col. 4, lines 15-19. The use of a textured metal foil or IBAD treated metal foil is shown to be used so that the electrolyte can be grown with atomic order both normal to and in the plane of the growth surface. See col. 4, lines 34-37.

The subject matter as a whole would have been obvious to one having ordinary skill at the time the instant invention was made because even though the prior art of Johnson does not show the deposition of the electrolyte using a dual deposition source, the prior art patents to both Chen et al and to Allen et al both show that the dual beam and single beam ion assisted deposition techniques are known to the person having ordinary skill in the art and that not only can the electrodes be deposited in such a manner, but the electrolyte as well can be

made in such a manner. Therefore one having ordinary skill in the art would have been motivated to use such deposition techniques for the purpose of improving the adherence of the thin films, for densifying the thin layers for specific applications or making the films more porous in other applications as well as improving the quality of the films for specific applications. The making of thin films is conventional both in the making of thin film batteries, fuel cells, capacitors, sensors and other devices as well that involve electrodes and electrolytes and therefore, it appears that the film deposition techniques found in Johnson, Allen et al and Chen et al are conventional in the art and would be used according to their need in specialized applications.

***Allowable Subject Matter***

3. Claims 7, 13-15, 38-41, 46-52, 55-61, 71-80, 85, 86, 88-90, 96, 97, 103-105 are allowable over the prior art of record.
4. The following is a statement of reasons for the indication of allowable subject matter: The prior art of record fails to teach and/or suggest supplying energized particles in the energy range or film thickness as set forth in the dependent limitations.

The closest prior art as set forth above in the 35 USC 103 rejection above, shows that the minimum energy supplied is 100 eV, which is higher than that instantly claimed in the instant dependent claims. The lowest film deposition as set forth in the prior art is around 250 angstroms whereas the thin film deposition in the instant dependent claims is 200 angstroms or less. Therefore, the closest prior

art fails to teach and/or suggest the instant invention as set forth in each respective dependent claim as set forth.

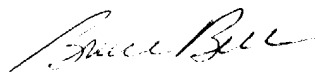
5. Claims 7, 13-15, 38-41, 46-52, 55-61, 71-80, 85, 86, 88-90, 96, 97, 103-105 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bruce F. Bell whose telephone number is 571-272-1296. The examiner can normally be reached on Monday-Friday 6:30 AM - 3:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Barr can be reached on 571 272-1414. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

BFB  
January 10, 2005

  
Bruce F. Bell  
Primary Examiner  
Art Unit 1746